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(54) BOATS

(71) We, DUNLOP LIMITED, an English Company of Dunlop House, Ryder Street, St. James's, London, S.W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to boats and particularly, but not exclusively, to life saving boats for use in connection with ships and marine installations.

Life saving boats may be broadly classified as either "rigid" or "pneumatic". Rigid boats are generally of conventional boat-like appearance and construction and are intended, when required for use, to be boarded from the deck of the parent vessel and then to be lowered by davits to sea level. Pneumatic boats are generally in the form of inflatable life rafts. These are usually housed, deflated, in containers located on a ship's deck or superstructure. Certain types of pneumatic boat are adapted to be boarded at deck level and then lowered to sea level. Most pneumatic boats, however, are intended to be both inflated and boarded in the sea.

Large passenger-carrying vessels, including ferries, require life saving provision for a large number of people, most of whom have little or no experience in boat-handling or survival at sea. The number of rigid life boats which can be carried by a ship is limited by the space available for installation and launching. Inflatable rafts can be stored in larger quantities but boarding such rafts in the sea presents difficulties for inexperienced and infirm persons. Such persons are also likely to experience discomfort in an inflatable raft owing to the considerable flexing which can occur, particularly in moderate to heavy seas.

We have found that the deficiencies of known rigid life-boats and inflatable life-rafts can be avoided by providing a life saving boat having a foldable, rigid hull and inflatable buoyancy tubes, which can be readily housed on a ship's deck and rapidly deployed so as to be boardable prior to being lowered to sea level.

Accordingly, the present invention provides a boat having a substantially rigid, foldable hull and a plurality of inflatable buoyancy tubes, the hull comprising two or more box-like components, each adjacent pair of box-like components being hinged together along abutting edges, in which means are provided to lock together each said adjacent pair of box-like components when the hull is opened.

The invention will now be described, merely by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a schematic view of one type of boat according to the present invention;

Figure 2 is a view of the boat of Figure 1 in the closed condition;

Figure 3 is a schematic view of a second type of boat according to the present invention;

Figure 4 shows the closed boat of Figure 2 adapted for use as a seat;

Figures 5, 6, 7 and 8 are views of alternative hull constructions;

Figure 9 is a view of an arrangement of buoyancy and support tubes;

Figure 10 is a section on line X—X of Figure 7;

Figure 11 is a view of a third type of boat according to the present invention;

Figure 12 is a transverse cross-section of a fourth type of boat according to the present invention, showing the means for securing together the hull components when the boat is in the deployed condition;

Figure 13 is a section on line XIII—XIII of Figure 12;

Figure 14 is a schematic view of a fifth type of boat according to the present invention and suitable for use as a pleasure craft, and

Figure 15 is a foreshortened stern view of a sixth type of boat according to the present invention.

All the embodiments as described herein have locking means to lock together each adjacent pair of box-like components when

the hull is opened. A particular locking means will be described later with reference to Figures 12 and 13.

Referring now to Figures 1 to 4, the boat has a rigid hull 10 comprising two hollow, box-like components 11, 12. The two components are hingedly attached to each other along one pair of abutting edges by hinge 13. When the boat is in the closed condition, all abutting edges may be detachably sealed together. Buoyancy tubes 20, when in the deflated condition, are stowed inside components 11 and 12, together with inflating means (not shown). Said inflation means may be activated externally of the hull, e.g. by a painter 14 which may be attached to an operating valve.

The boat may be provided with a collapsible canopy or roof 30, which may be supported on rigid struts or inflatable arches 31.

A boat in the closed condition may be located on a ship's deck where, as shown in Figure 4, it can be adapted for use as a seat (similar seats are required in large numbers particularly on ferry boats). End supports 40 and 41 (which are connected by back-rest 42) are firmly attached to the ship's deck, whilst the rigid hull 10 is releasably attached thereto (by means not shown). Alternatively, the configuration of the box-like components forming the hull may be such that the closed hull can be used as a seat or other article of furniture without recourse to the fixed supports 40 and 41.

Thus, the closed hull of the boat can be usefully employed as deck furniture but is readily available for emergency use. In such a situation the hull is released from its attachment means and hauled to a preselected, davit launching area. There, the inflation means are activated causing the buoyancy tubes to inflate and in so doing, to force apart the hinged-together components of the hull. When the hull is opened, the hinged-together components are locked together by the locking means to form a rigid keelson. Lifting straps 18 are attached to a shackle 19 adapted to receive the hook of a launching davit. The boat may then be boarded and lowered over the ship's side.

The rigid hull may suitably be formed from a synthetic plastic material which may optionally be reinforced. Glass-reinforced plastics materials are suitable. Certain vacuum-formable thermoplastics materials are also suitable. As is well known in the plastics art, small gas-filled voids may be included in the material to reduce weight and improve buoyancy. The hull may also be designed to include ribs and other local reinforcing devices.

The hinged connection between the two components may be an integral feature. Polypropylene, for example, is known to having outstanding "hinge" properties. More usually however the two components will be produced as separate units and joined together by the hinging means. Suitable means may comprise a rubberised fabric strip extending the full length of the contiguous edges and adhesively attached to the abutting sidewalls.

Although the rigid hull is conveniently substantially rectangular in plan and in cross-section, it is within the scope of the invention to provide a hull which is more conventionally boat-shaped. Figure 5, for example, shows a hull formed from two hinged-together components 50, 51, which converge at one end of the hull to form a bow 52. Figure 6 shows a hull so shaped in cross-section as to provide a keel 60 and side strakes 61, 62. The constructions shown in Figures 5 and 6 improve the steerability of the boat. This may be compared with relative lack of steerability in a conventionally shaped inflatable life raft. Propulsion means, for exampe, sails, oars and inboard or outboard motors may be included, together with suitable provision for their housing and use.

The hull is of seamless, watertight construction and its watertightness can be improved by means of a continuous waterproof membrane, conforming to the internal shape of the hull and adhesively attached to the array of buoyancy tubes. A representative arrangement of such a construction is shown in Figure 7. In addition to ensuring watertightness, the membrane 70, by virtue of a layer of air trapped beneath it, improves the thermal insulation properties of the hull.

One method of constructing a life-saving boat according to the present invention will be described in the following example:—

Referring now to Figure 8, two rectangular box-like components 80 and 81, each measuring approximately 4 m×1.25 m×0.3 m, are constructed from a glass-reinforced plastics material.

Outwardly-projecting flanges 82, 83, 84, 85, each approximately 50 m wide, are provided (integrally) along both ends and one side of each component. The sides of each component which will eventually be hinged together (86, 87) are not flanged. The base of each component is slightly curved, and the eventual bow end of each is raked to form a punt-like prow (not shown).

The components 80 and 81 are joined together along their unflanged sides 86, 87, by means of an adhesively attached sheet of "rubberised" fabric 88. The sheet of fabric extends over the hull length of the joined-together sides and extends downwards (on each side of the join) to a depth of approximately 100 mm. Such a construc-

tion will hereinafter be referred to as a "hinged hull".

Using methods and materials well known in the art, an array of inflatable buoyancy tubes is constructed as shown in Figure 9. Items 90 and 91 are identical buoyancy tubes, each having a nominal diameter of 300 mm and being attached one above the other as shown. Each tube is provided with internal bulkheads (not shown), inflation means and safety valves. An inflatable, roof-supporting strut 92 is attached to and communicates with tube 91.

The buoyancy array described in the immediately-preceding paragraph is attached by means of adhesives and doublers to the hinged hull, generally as indicated in Figure 10. Item 101 is rubberised fabric doubler adhesively attached between lower buoyancy tube 102 and the inner surface of a flanged side 103 of the hinged hull.

A membrane of rubberised fabric, fabricated to conform to the internal configuration of the hinged hull, is fitted into the hull and adhesively attached to the lower buoyancy tube as indicated in Figure 7. Figure 11 shows a roof or canopy 110 of rubberised fabric, having sealable access means, adhesively attached to the upper buoyancy tube and the inflatable strut (not shown).

Synthetic textile lifting straps 111, each having a breaking strength in excess of 15,000 lbs, are firmly attached, one to each internal corner of the hinged hull (a total of 8 straps—4 at each end). The straps are taken diagonally upwards, through suitable openings 112 in the canopy, to converge at a central point above the apex. There the ends of the straps are bound together to form a loop 113 adapted to engage a shackle or lifting hook. To improve the rigidity of the deployed hinged hull, "U"-section spring clips 114 may be fitted.

Gas inflation means comprising cylinders, valves, controls and hoses were fitted into the hinged hull and an operating line or painter was installed.

The buoyancy array including the roof struts is deflated and allowed, with its attached canopy, to collapse inside the hinged hull. Sealing means as disclosed were disposed around the outstanding flanges of the hinged hull which can now be "closed" by folding along the centre line of the hinge to produce the arrangement shown in Figure 2.

The boat is deployed for use by pulling line 14 to activate the inflation means. As the enclosed buoyancy array inflates, it is urged against the two components of the hull causing the sealing means to rupture. As inflation proceeds the upper component is caused to rotate about the central hinge thus re-forming the hinged hull.

Although the boat described above is suitable for inflation on and launching from a ship's deck, it is equally suitabl for inflation in the sea—in the manner of an inflatable life raft. To facilitate boarding in such conditions, lines, chutes and other boarding means can be provided.

The boat may also be adapted for launching, for example, by means of an inclined cable extending from the platform of a marine installation to a distant mooring. Such a cable may be provided with releasable pulley means attached to shackle 19.

The hull dimensions given in this example are such as will provide a boat suitable for the accommodation of 25 persons under the prevailing SOLAS regulations, which prescribe a minimum floor area of 3 square feet of floor area per person.

Referring now to Figures 12 and 13, adjacent box-like hull components 120 and 121 are locked together when the hull is opened by locking means 122. The locking means comprises a heart-shaped member 123 (on hull component 121), which engages a rod 124 (or hull component 120).

It will be appreciated that the above-described constructions are applicable to collapsible or foldable craft for purposes other than life-saving, e.g. tenders, pleasure craft, assault craft.

The boats shown in Figures 14 and 15, for example, may be adapted for use as pleasure craft and may be provided with a waterproof dodger 141 to protect the occupants of the boat from spray.

WHAT WE CLAIM IS:—

1. A boat having a substantially rigid, foldable hull and a plurality of inflatable buoyancy tubes, the hull comprising two or more box-like components, each adjacent pair of box-like components being hinged together along abutting edges, in which means are provided to lock together each said adjacent pair of box-like components when the hull is opened.

2. A boat according to Claim 1, in which each box-like component is made of a synthetic plastics material.

3. A boat according to Claim 1, in which each box-like component is made of a vacuum-formable thermoplastics material.

4. A boat according to Claim 1, 2 or 3, in which each box-like component is made of a fibre-reinforced material.

5. A boat according to Claim 4, in which the fibres are glass fibres.

6. A boat according to any one of the preceding claims in which each box-like component is provided with reinforcing ribs.

7. A boat according to any one of the preceding claims, which, when the hull is closed, is adapted for use as a seat or other item of deck furniture.

8. A boat according to any one of the preceding claims in which the hull is lined

with a continuous waterproof membrane conforming to the internal shape of the hull and being attached at its periphery to th buoyancy tubes.

9. A boat according to any one of the preceding claims, in which the inflatable buoyancy tubes are provided with means to support a canopy when the hull is opened.

10. A boat according to any one of the preceding claims, having a waterproof dodger to protect the occupants of the boat from spray.

11. A boat substantially as hereinbefore described, with reference to and as illustrated in Figures 1, 2 and 4 of the accompanying drawings.

12. A boat, substantially as hereinbefore described, with reference to and as illustrated in Figure 3 of the accompanying drawings.

13. A boat, substantially as hereinbefore described, with reference to and as illustrated in Figures 5, 6, 7, 8 and 10 of the accompanying drawings.

14. A boat substantially as hereinbefore described, with reference to and as illustrated in Figure 11 of the accompanying drawings.

15. A boat, substantially as hereinbefore described, with reference to and as illustrated in Figures 12 and 13 of the accompanying drawings.

16. A boat, substantially as hereinbefore described, with reference to and as illustrated in Figures 14 or 15 of the accompanying drawings.

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Agent for the Applicants.

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1571612 COMPLETE SPECIFICATION
5 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

FIG.1

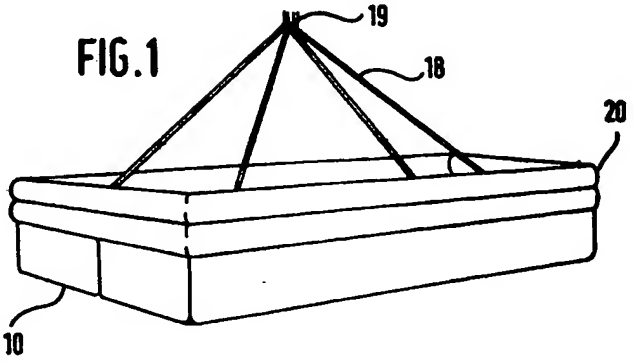


FIG.2

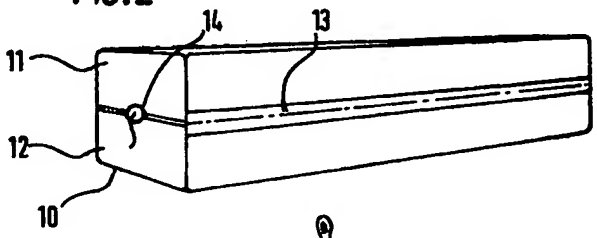


FIG.3

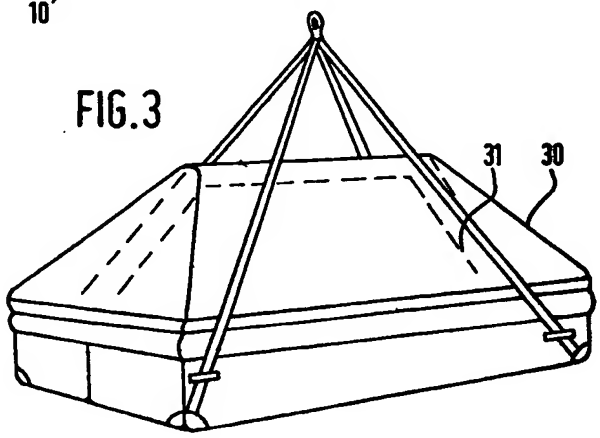


FIG.4

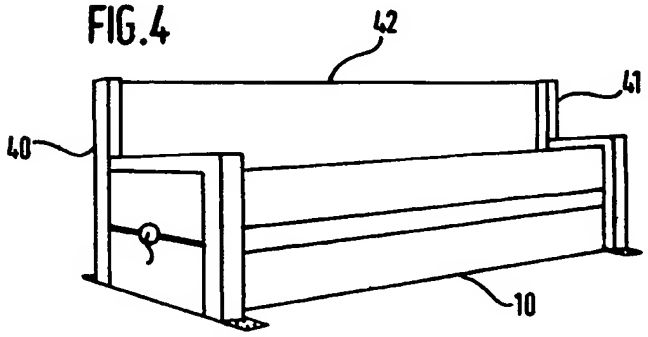


FIG.5

FIG.6

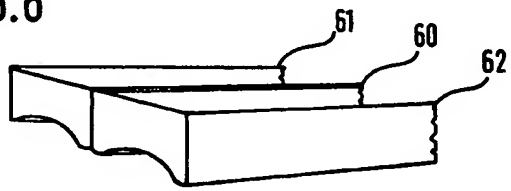


FIG.7

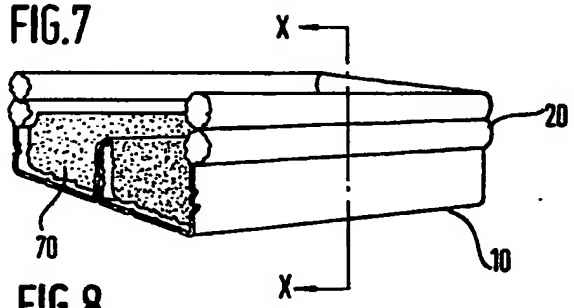


FIG.8

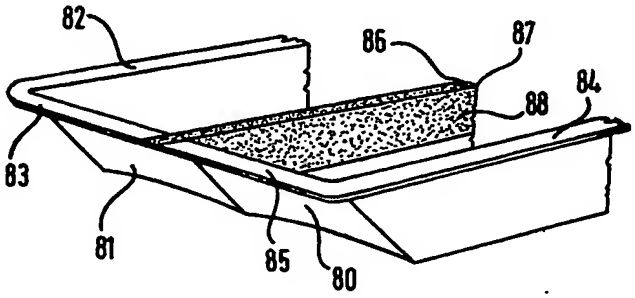
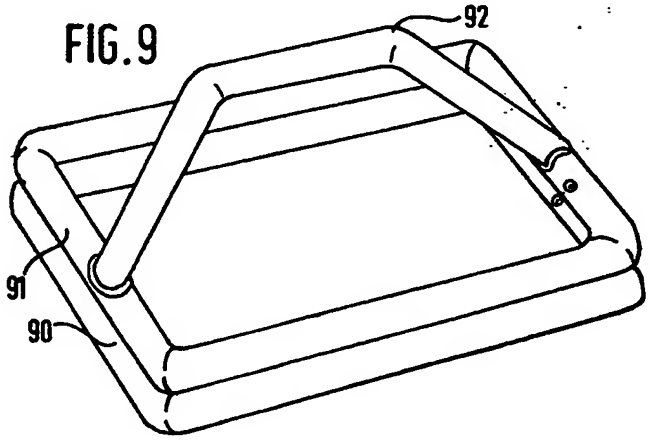


FIG.9



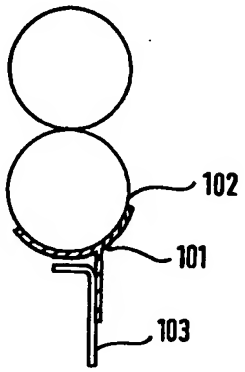
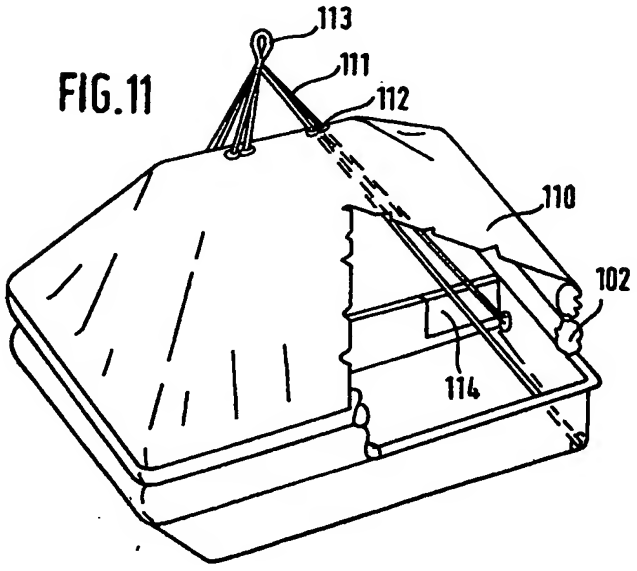


FIG.10

FIG.11



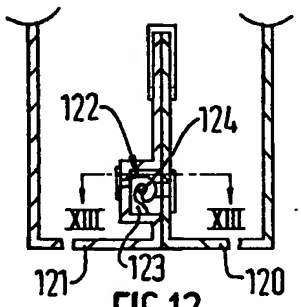


FIG.12

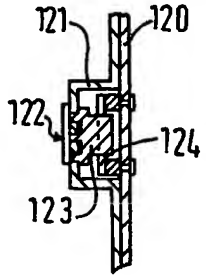


FIG.13

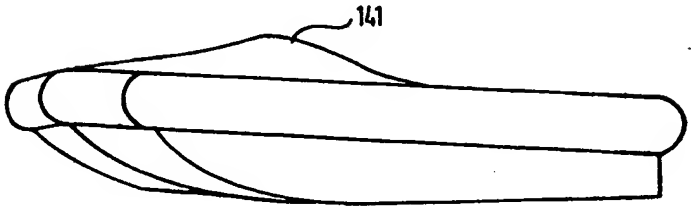


FIG.14

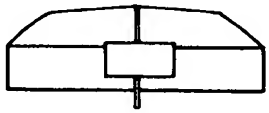


FIG.15